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BEFORE THE

ROYAL COMMISSION


ON ENERGY

CANADA

Submission of

Jefferson Lake Sulphur Company

FEBRUARY 1958



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*Francis Edgar Lewis.
VIP ye sales
from Houston
Texas*

SULPHUR PRODUCTION, CONSUMPTION RESERVES

Sulphur or brimstone as it was known to the ancients is one of the earliest known minerals or elements. The first records of its use are in the Asian and Egyptian civilizations where it was used in medicine, cosmetics and in religious rites. Sulphur is one of the most basic commodities known to mankind having a wide variety of uses, primary among which is in the manufacture of sulphuric acid. Approximately 80% of all sulphur produced is consumed in the manufacture of sulphuric acid which is used in the manufacture of practically every article used by civilized man today.

The consumption of sulphur or sulphuric acid can be used to measure the extent of industrialization of a nation and some idea of its accuracy as a yardstick in this respect can be had from the fact that toward the end of World War 2 the Allied Intelligence Service used the figures on German production and consumption of sulphuric acid to determine the effectiveness of their bombing attacks on Germany to reduce industrial output.

The earliest commercial production of sulphur in large quantities was in the countries of Italy, Sicily and Spain. In these countries are located volcanic deposits of sulphur which prior to the 20th century produced essentially all the world's supply of elemental sulphur. The sulphur was produced by hand picking the ore, collecting it in piles which were then covered with a brick oven structure with a vent at the top.

Holes were provided at the bottom of the structure which could be opened or closed to control the amount of oxygen fed to the kiln or furnace and the sulphur ore was ignited at the bottom. As the sulphur burned other sulphur was smelted out of the ore matrix and the molten sulphur flowed by gravity to the bottom of the pile and out of the furnace where it was collected for storage.

By the beginning of the 20th century sulphur had been discovered in the cap rock of salt domes along the Gulf Coast of Texas and Louisiana while exploring for oil, and Herman Frasch had developed a process known today as the Frasch Process for mining this sulphur. A syndicate was formed and after one or two failures Herman Frasch's company successfully produced sulphur from a salt dome deposit in Louisiana by his new process. The costs of production of sulphur by the Frasch Process were so much less than the costs of laboriously mining by hand the volcanic sulphur depos-

its that Frasch Process sulphur soon dominated world markets. Other companies were formed to produce sulphur by the Frasch Process, and in addition to the Union Sulphur Company (Herman Frasch's Company), Freeport Sulphur Company, Texas Gulf Sulphur Company, Jefferson Lake Sulphur Company and Duval Sulphur Company became producers of sulphur.

As mentioned above, sulphur occurs in the cap rock of salt domes which are found in the Gulf Coast of Texas and Louisiana. Sulphur does not occur in all of these domes, and of the known salt dome structures along the Gulf Coast (which number in excess of 300 to date) only about 20 have proved commercially productive of sulphur. The Frasch Process consists essentially of melting the sulphur in place with superheated hot water and lifting it to the surface with compressed air. A well is drilled into the cap rock of the dome and casing is set above the salt. A 6-inch hot water line is then placed inside of this casing and within the 6-inch a 3-inch sulphur line is set. The bottom portion of the 6-inch line is perforated to permit the escape of hot water into the formation while the bottom section of the 3-inch line is perforated, to permit molten sulphur collecting around the base of the well to enter the 3-inch line for lift to the surface.

Inside of the 3-inch line a 1¼-inch compressed air line is extended to the bottom of the well, and after superheated hot water has been forced into the formation and a pool of molten sulphur collected at the base of the well, the compressed air is turned on, lifting the molten sulphur to the surface. The molten sulphur is then allowed to solidify in large blocks called vats from which it can then be removed in solid form by power shovels for shipment to the consumer.

Since the turn of the century the sulphur industry has been centered along the Gulf Coast of Texas and Louisiana and from these Frasch Process Mines, approximately 90% of the world's supply of elemental sulphur has been produced. Within the last few years there have been several discoveries of sulphur in the Isthmus of Tehuantepec in Mexico. These discoveries have added substantially to the world's reserves of elemental sulphur recoverable by Frasch Process mining, and production from these mines is rapidly becoming of major significance. There are presently three Frasch Process producers in Mexico and their production of sulphur in 1957 was in excess of one million long tons.

Until recent years there was no other process for the production of elemental sulphur that could compare in cost of production with the Frasch Process. However, during the past ten years the Claus Process was developed to the point where production costs of elemental sulphur by this method now compare favorably with production costs from the Frasch Process mining operation. The Claus Process is based on catalytic chemistry and is used to recover sulphur from sour gas. After the hydrogen sulphide has been extracted from the sour gas the hydrogen sulphide is fed into a Claus Process sulphur plant where one-third of it is burned with air to form sulphur dioxide. The sulphur dioxide formed is then reacted catalytically with the remaining two-thirds of the hydrogen sulphide to produce elemental sulphur of acceptable quality.

The successful development of this process, today makes the sulphur contained in Canada's reserves of sour natural gas of economic significance. The large tonnage of sulphur represented in the Canadian sour gas reserves places Canada in the position of being one of the three countries in the world having substantial reserves of economically recoverable sulphur.

In 1956 world consumption of sulphur in all forms totalled 14,916,000 long tons which was divided into 7,678,000 long tons of elemental sulphur and 6,800,000 long tons of elemental sulphur from pyrites. Today pyrites account for approximately 46% of world sulphur consumption compared to

approximately 59% in 1937. This shift in use pattern emphasizes the desirability of elemental sulphur as a raw material for the production of sulphuric acid as compared to pyrites. This shift would have been even more pronounced had it not been retarded by the shortage of elemental sulphur existing from the beginning of World War 2 up until shortly after the Korean War ended.

Canadian sulphur consumption today is concentrated largely in the Provinces of British Columbia and Alberta in the west and in Eastern Canada. The following table shows the estimated consumption of sulphur in the various areas of Canada today.

<u>Province</u>	<u>Use — Thousand Long Tons</u> <u>Sulphuric Acid, Pulp and Paper</u>		<u>Annual</u> <u>Total</u>
British Columbia -----	0	60	60
Alberta -----	50	3	53
Northwest Territories -----	2	0	2
Saskatchewan -----	20	0	20
Manitoba -----	0	3	3
Western Ontario -----	0	40	40
Eastern Ontario -----	35	40	75
Quebec -----	35	50	85
New Brunswick -----	0	65	65
Nova Scotia -----	4	8	12
Newfoundland -----	0	35	35
Totals -----	146	304	450

Sulphur consumption in the areas of the United States which can logically be served from producing points in Western Canada is as follows:

1. In the States of Washington and Oregon approximately 225,000 long tons of sulphur are annually consumed in the pulp and paper industry.
2. Only minor quantities of sulphur are consumed in the Western States of Idaho, Montana, Wyoming and the Dakotas.
3. In the area bordering the Great Lakes approximately 1,100,000 long tons of sulphur are consumed annually for the production of sulphuric acid. In this same area approximately 80,000 long tons are consumed annually in the production of pulp and paper.
4. The remaining portion of the middlewestern United States consumes 375,000 long tons of sulphur annually.

From these figures it can be seen that there is presently a market for approximately two million long tons of sulphur in Canada and the United States that can logically be served from the Alberta plants, if rail freight rates which are competitive to these areas.

The current production of sulphur in Canada from the existing plants located in Alberta and British Columbia is being sold in the Western Provinces of Canada and the Pacific Northwest States of Washington and Oregon which provide an adequate market.

World consumption of elemental sulphur has shown an annual growth rate of 4.75% per year for the past 20 years. At the same time consumption of sulphur in the United States has shown

an annual increase of 5.25% per year exceeding the increase in the Federal Reserve Board index of industrial production of 4.75% annually. Sulphur consumption in the United States is expected to continue to increase at this rate or at a somewhat greater rate in the period from now until 1965, while world consumption is expected to show a substantially greater rate of growth. Foreign consumption is expected to increase more rapidly because of the discoveries of substantial sulphur reserves for both Frasch Process mining and from Canadian sour gas which assure the consumer a dependable long range source of supply. Since the end of World War 2 the growth rate in the consumption of elemental sulphur has been retarded by lack of assurance of adequate reserves and availability of supplies, and as a result of these uncertainties numerous acid plants were built throughout the world based upon the use of pyrites as a source of sulphur.

The recent discoveries of sulphur in Mexico and the construction of Frasch Process operations there have given an added impetus to the growth in consumption of elemental sulphur and this trend can be expected to continue in the future.

The following statistics from the U.S. bureau of Mines are presented in support of these projections:

Sulphur prices are traditionally stable and have shown very little increase percentagewise since the middle 1930's. Since the middle 1930's the price of sulphur increased from \$18.00 per ton to a high of \$26.50 per ton, and the present price is \$23.50 per long ton. This is an increase of only 30% over a 20-year period while the general price level for all commodities has more than doubled. Obviously Canadian sulphur must compete with Frasch Process sulphur from the United States and Mexico, and in order to sell in the world markets Canadian sulphur must be competitive not only on an f.o.b. plant or mine cost basis but also on a delivered cost basis.

Canadian sulphur is presently faced with competition of elemental sulphur from the Frasch Process Mines in the Gulf Coast of Texas and Louisiana and from the Isthmus of Tehuantepec in Mexico. In the future, in addition to the competition of Frasch Process sulphur there will also be competition from sulphur produced from sour gas in other areas, such as the Lacq field in Southern France and in some areas in the Middle East.

The Frasch Process Mines in the Gulf Coast and in Mexico have an advantageous location near deep water for export shipments. In addition it has been the traditional policy of the United States railroads to grant export rates which are much lower than domestic rates., e.g. the domestic freight rate on sulphur from the various Texas mines to Houston is a maximum of \$3.22 per long ton while the export rate is \$1.51. At the same time sulphur can be shipped by barge through the inter-coastal waterway up the Mississippi River to the Great Lakes area where it can be transferred from the barges to lake steamers, railroad cars or trucks for delivery to the various consuming points.

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This points out the need for export rates on sulphur from the Alberta producing points to the port of Vancouver and to some port on the Great Lakes. Also a commodity rate structure on sulphur must be established to the various inland consuming points along the Great Lakes and middle western United States to place Alberta sulphur in a competitive position with sulphur produced in the Gulf Coast and in Mexico. There are substantial advantages to the railroads in establishing such a rate structure, since sulphur for export could be shipped to terminals at Vancouver or along the Great Lakes in trainload quantities and stock pile for future loading of vessels. In addition to the export shipments, the movement from the Alberta plants by rail direct to consumers in Canada and the United States would represent substantial new tonnage for the railroads and a source of revenue

not presently in existence. The anticipated sales to the Pacific Northwest area and the Great Lakes and central areas of the United States would certainly aid in establishing a balance of trade between the two countries.

We cannot emphasize too strongly the importance of timing in these developments. Offshore reserves of sulphur have been discovered along the Texas Gulf Coast, and with the continuing oil exploration program offshore, additional reserves are sure to be found. One of these deposits is scheduled to come into production in 1961 or 1962.

Present sulphur reserves in Mexico would support today additional mining facilities and the continuing exploration program in the Isthmus of Tehuantepec will undoubtedly develop additional reserves. With the continuing increase in world-wide consumption of sulphur it will be necessary to bring into production new sources of supply, and if we fail to take advantage of this opportunity some of our competitors in the Gulf Coast or in Mexico undoubtedly will do so.

Once such an operation is established and is serving the various markets it is difficult for the newcomer to break in, and he must either wait until additional demand develops to absorb his production or must make concessions in order to induce the users to switch suppliers, e.g. the Mexican producers were forced to grant price concessions of as much as \$5.00 to \$6.00 per ton in order to break into the market when they commenced their operations in 1954 and 1955.

It is essential that sulphur produced as a by-product from gas in Alberta be marketed at a price which will cover the cost of gathering the sour wet gas, the cost of processing, and a return on the large investment in plant facilities.

If the sulphur is not marketed at such price then, since gas can only be marketed after sulphur has been removed, the cost of removing the sulphur, cost of storing the sulphur for future sale and the payment of a return on the investment in the plant all must be charged against the price received for the gas as a fuel. This, in turn, will restrict the amount of money available for gas development. It will also render a great deal of potential gas reserves of Western Canada uneconomic in the sense that they cannot be developed on the basis of the sale of gas at a price which will recover the cost of production plus a reasonable profit to the producer.

There is a great deal to be gained by Canada in proceeding without any delay to secure for Canada markets for the gas to be produced in Western Canada at favorable prices. This will mean that the sulphur plants can be erected and the sulphur available for marketing within two years. At that time this sulphur will have the best opportunity to obtain the markets within reasonable distance of Western Canada. Otherwise sales in such markets will be met by competition from other sources where production of sulphur is now planned.

Speaking specifically with respect to the Jefferson Lake Sulphur Company plant at Taylor, British Columbia, it is the opinion of the officials of the company that a market can be established for the sulphur produced from that plant in competition with sulphur from competitive sources.

Similarly, it is the opinion of the officials of the Jefferson Lake Company that if the plants are proceeded with without delay the sulphur from plants proposed to be constructed at Calgary and at Coleman, Alberta, can be marketed at favorable rates in the face of competition from other sources.

Delay in the completion of plans, however, for the construction of the two proposed plants in Alberta will undoubtedly be prejudicial to efforts at a later date to find a market for the product of the plants.

TABLE I

UNITED STATES SULPHUR CONSUMPTION

Thousands Of Long Tons

(Addendum To Tentative Forecast For 1956)

	1946	1956	1965 Est.	Average Rate of Growth Per Year	
				1946-1956 (10 Yrs.)	1956-1965 (9 Yrs.)
Frasch and other mined					
Elemental Sulphur	2,848	4,258	5,200	4%	2¼ %
Recovered Elemental	35	432	1,500	26¼ %	14½ %
Sub-Total Elemental	2,883	4,690	6,700	5%	4%
Recovered as Acid	252	437	700	5¾ %	5½ %
Pyrites	425	607	700	3½ %	1½ %
Total U.S. Consumption	3,560	5,735	8,100	5%	4%

This table shows the average annual rate of growth in United States consumption during the periods 1946 — 1956 and 1956 — 1965. The growth to forecast 1956 levels is consistent with historical figures.

Jefferson estimate

TABLE II

U.S. FEDERAL RESERVE BOARD INDICES OF PRODUCTION

Thousands of Long Tons

	<u>1947</u>	<u>1956</u>	<u>Average Rate of Growth Per Year 1947-1956 (9 Yrs.)</u>
Overall Industrial Production	100	143	4¼ %
Chemicals and Allied Products	97	177	7 %
Industrial Chemicals	95	196	8¼ %
Basic Inorganic Chemicals	96	189	7¾ %
Fertilizers	98	129	3 %

To support the 1965 estimates further, we need only turn to forecasts for the entire chemical market made by three recognized organizations. They are the Paley Commission, Stanford Research Institute, and the Manufacturing Chemists Association. These three sources estimate 1980 chemical consumption at 400 - 700% greater than that in 1955. In other words, they forecast demand increasing on the average of 5½ % - 8 % per year. Not only is this consistent with 1947-56 data shown in Table II, but also confirms the 4% figure arrived at for total U.S. sulphur consumption from 1956 to 1965. The reason that this figure is on the low side of the range just quoted is because sulphur is a basic commodity not subject to rapid increases of newer and more rapidly obsoleted products. Also, note the lower growth rate in fertilizer production in Table II, 3% per year—a factor tending to hold down the rate of increase of sulphur since a large portion of total sulphur demand is for manufacture into agricultural chemicals and plant nutrients.

Table II confirms that the 1946-1956 sulphur consumption is in line with the rate of growth of over-all industrial and other chemical productivity records.

TABLE III

SULPHUR PRODUCTION EXCLUDING UNITED STATES

We have forecasted elemental sulphur production outside the United States in 1965 at 5,000,000 long tons. The estimates are based on historical growth rates, knowledge of reserve limitations, and available data on newly developed or contemplated plants.

Country	Thousands of Long Tons	
	1956	1965
Mexico	758	1,800
Canada	50	1,400
France	0	900
Japan	243	300
Italy	170	200
Argentina	23	50
Chile	60	90
All Others	211	260
	1,515	5,000

U.S. Bureau of Mines

Jefferson forecast

TABLE IV

SULPHUR PRODUCTION AND CONSUMPTION

(Addendum To Tentative Forecast For 1965)

	Production Thousands of Long Tons	Consumption
UNITED STATES—		
Mined Elemental	7,800	5,200
Recovered Elemental	1,500	1,500
Sub-Total	9,300	6,700
Recovered as Acid	700	700
Pyrites	500	700
Total	10,500	8,100
FOREIGN—		
Elemental	5,000	7,600
Pyrites	7,700	7,500
Total	12,700	15,100
WORLD-WIDE—		
Elemental	14,300	14,300
Pyrites (Incl. S recovered as Acid)	8,900	8,900
Total	23,200	23,200

*Jeffers 0-12-65
forecast*

TABLE IA

U.S. PRODUCTION OF SULPHUR

Year	Pyrites as Sulphur	Sulphur in By-Product H ₂ SO ₄ from Smelters (CuS and ZnS)	Sulphur in By-Product Gases from all other operations, recovered as H ₂ S, SO ₂ , etc.	Total— All Forms
1937	232	209	n.a.	3,183
1938	219	171	n.a.	2,783
1939	218	195	13	2,523
1940	263	210	16	3,231
1941	271	224	n.a.	3,638
1942	307	240	19	4,034
1943	337	300	18	3,202
1944	333	284	22	3,876
1945	296	275	19	4,368
1946	337	234	18	4,484
1947	392	237	21	5,134
1948	388	187	26	5,514
1949	378	167	38	5,387
1950	393	216	42	5,986
1951	433	241	60	6,197
1952	418	253	67	6,284
1953	380	253	80	6,248
1954	405	259	73	6,675
1955	410	325	94	7,026
1956	432	348	89	7,818 4.75% **

** Rate of annual growth.

U.S. Bureau
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J. H. Jones

TABLE 1A (Continued)

U.S. PRODUCTION OF SULPHUR

Thousand Long Tons

<u>Year</u>	<u>Frasch Mine</u>	<u>Other Mine</u>	<u>Total Mine</u>	<u>Recovered as Sulphur from Refineries and Natural Gas</u>	<u>Total Mined and Recovered</u>
1937	2,742	None	2,742	n.a.	2,742
1938	2,393	None	2,393	n.a.	2,393
1939	2,090	3	2,093	4	2,097
1940	2,732	6	2,738	4	2,742
1941	3,139	n.a.	3,139	4	3,143
1942	3,461	2	3,463	5	3,468
1943	2,539	3	2,542	5	2,547
1944	3,218	n.a.	3,218	19	3,237
1945	3,753	n.a.	3,753	25	3,778
1946	3,860	n.a.	3,860	35	3,895
1947	4,441	n.a.	4,441	43	4,484
1948	4,869	n.a.	4,869	44	4,913
1949	4,745	2	4,747	47	4,804
1950	5,192	1	5,193	142	5,335
1951	5,279	1	5,280	184	5,464
1952	5,293	2	5,295	251	5,546
1953	5,156	38	5,194	342	5,536
1954	5,515	64	5,579	359	5,938
1955	5,739	61	5,800	399	6,199
1956	6,424 4.5% **	60	6,484	465	6,949 5% **
1957 *	5,483	60	5,543	510	6,053

* Extrapolated from first nine months data.

TABLE IIA

PRODUCTION OUTSIDE UNITED STATES

Thousand Long Tons

		<u>Elemental Sulphur</u>	<u>Pyrites</u>	<u>Total</u>
1937	-----	658	4,600	5,258
1938	-----	607	4,500	5,107
1939	-----	609	4,400	5,009
1940	-----	568	4,200	4,768
1941	-----	561	4,000	4,561
1942	-----	540	3,550	3,890
1943	-----	461	3,500	3,961
1944	-----	281	2,600	2,881
1945	-----	247	1,770	2,017
1946	-----	341	2,610	2,951
1947	-----	359	3,250	3,609
1948	-----	413	3,540	3,953
1949	-----	455	4,150	4,605
1950	-----	508	4,507	5,015
1951	-----	620	4,917	5,537
1952	-----	705	5,482	6,187
1953	-----	606	5,260	5,866
1954	-----	721	5,595	6,316
1955	-----	1,200	6,290	7,490
1956	-----	1,516	6,368	7,884
1957	-----			

U. S.
Bureau of Mines

TABLE IIIA

WORLD PRODUCTION

Thousand Long Tons

	<u>Elemental and Recovered</u>	<u>Pyrites</u>	<u>Total, All Forms</u>
1937	3,400	4,832	8,441
1938	3,000	4,719	7,890
1939	2,706	4,618	7,532
1940	3,310	4,463	7,999
1941	3,704	4,271	8,199
1942	4,088	3,857	7,924
1943	3,008	3,837	7,163
1944	3,518	2,933	6,757
1945	4,025	2,066	6,385
1946	4,236	2,947	7,435
1947	4,843	3,642	8,743
1948	5,326	3,928	9,467
1949	5,259	4,528	9,992
1950	5,843	4,900	11,001
1951	6,084	5,350	11,734
1952	6,251	5,900	12,471
1953	6,142	5,640	12,114
1954	6,659	6,000	12,991
1955	7,399	6,700	14,516
1956	8,465 4.8% **	6,800 2.0% **	15,702 3.5% **
1957			

** Rate of annual growth.

US Bureau of
Geology

TABLE IVA

UNITED STATES CONSUMPTION OF SULPHUR

Thousand Long Tons

	<u>Native Sulphur</u>	<u>Recovered Sulphur</u>	<u>Total Elemental</u>
1937	1,778	n.a.	1,778
1938	1,040	n.a.	1,040
1939	1,595	4	1,599
1940	1,820	4	1,824
1941	2,344	4	2,348
1942	2,472	5	2,477
1943	2,525	5	2,530
1944	2,905	19	2,924
1945	2,907	25	2,932
1946	2,848	35	2,883
1947	3,490	43	3,533
1948	3,720	44	3,464
1949	3,410	42	3,452
1950	4,159	79	4,238
1951	3,786	194	3,980
1952	3,728	224	3,952
1953	3,932	314	4,246
1954	3,700	342	4,042
1955	4,246	380	4,626
1956	4,258	432	4,690 5.25% **
1957			

** Rate of annual growth.

U.S. Bureau
of Mines

TABLE IV A (continued)

UNITED STATES CONSUMPTION OF SULPHUR

Thousand Long Tons

	<u>Pyrites as Sulphur</u>	<u>Smelter Acid</u>	<u>By Product from other operations</u>	<u>Total — All Forms</u>	
1937	483	209	n.a.	2,470	
1938	379	171	n.a.	1,590	
1939	449	195	13	2,256	
1940	458	210	16	2,508	
1941	448	224	—	3,020	
1942	451	240	19	3,187	
1943	460	300	18	3,308	
1944	418	284	22	3,648	
1945	385	275	19	3,611	
1946	425	234	18	3,560	
1947	453	237	21	4,244	
1948	440	187	26	4,417	
1949	436	167	38	4,093	
1950	493	216	42	4,989	
1951	539	241	60	4,820	
1952	560	253	67	4,832	
1953	471	253	80	5,050	
1954	539	259	73	4,913	
1955	581	325	94	5,626	
1956	607	348	89	5,735	4.5% **
1957					

** Rate of annual growth.

U.S. Bureau
of Mines

TABLE V

CONSUMPTION OF SULPHUR OUTSIDE UNITED STATES

Thousand Long Tons

	<u>Elemental— Crude and Crushed</u>	<u>Pyrites as Sulphur</u>	<u>Total</u>
1937	1,347	4,250	5,597
1938	1,195	4,340	5,535
1939	1,234	4,170	5,404
1940	1,278	4,005	5,283
1941	1,263	3,820	5,083
1942	1,073	3,405	4,478
1943	1,111	3,380	4,491
1944	957	2,515	3,472
1945	1,190	1,681	2,871
1946	1,587	2,522	4,109
1947	1,705	3,189	4,894
1948	1,709	3,488	5,197
1949	1,916	4,092	6,008
1950	1,986	4,407	6,393
1951	1,929	4,811	6,740
1952	2,038	5,340	7,378
1953	1,876	5,169	7,045
1954	2,395	5,461	7,856
1955	2,801	6,119	8,920
1956	2,988 4.25% **	6,193 2% **	9,181 2.75% **
1957			

** Rate of annual growth.

U.S. Bureau of Mines

TABLE VI

WORLD CONSUMPTION OF SULPHUR

Thousand Long Tons

	<u>Elemental</u>	<u>Pyrites</u>	<u>Total—All Forms</u>
1937	3,125	4,733	8,067
1938	2,235	4,719	7,125
1939	2,833	4,619	7,660
1940	3,102	4,463	7,791
1941	3,611	4,268	8,103
1942	3,550	3,856	7,665
1943	3,641	3,840	7,799
1944	3,881	2,923	7,120
1945	4,122	2,066	6,482
1946	4,470	2,947	7,669
1947	5,238	3,642	9,138
1948	5,473	3,928	9,614
1949	5,368	4,528	10,101
1950	6,224	4,900	11,382
1951	5,909	5,350	11,560
1952	5,990	5,900	12,210
1953	6,122	5,640	12,095
1954	6,437	6,000	12,769
1955	7,427	6,700	14,546
1956	7,678 4.75% **	6,800 2% **	14,916 3.25% **
1957			

** Rate of annual growth.

*U.S. Bureau
of Mines*

TABLE VII

UNITED STATES AND OUTSIDE IMPORTS AND EXPORTS OF SULPHUR

Thousand Long Tons

		UNITED STATES IMPORTS (Assumed equal to Outside Exports)			
		<u>Elemental</u>	<u>Forms, n.e.s.</u>	<u>Pyrites</u>	<u>Total</u>
1937	-----	None	0	251	251
1938	-----	"	2	160	162
1939	-----	"	14	231	245
1940	-----	"	28	195	223
1941	-----	"	29	177	206
1942	-----	"	26	144	170
1943	-----	"	16	123	139
1944	-----	"	nil	85	85
1945	-----	"	nil	89	89
1946	-----	"	nil	88	88
1947	-----	"	nil	61	61
1948	-----	"	nil	52	52
1949	-----	"	nil	58	58
1950	-----	"	nil	100	100
1951	-----	2	.5	106	108
1952	-----	5	nil	142	147
1953	-----	.5	.7	91	92
1954	-----	nil	1	134	135
1955	-----	24	11	171	206
1956	-----	15	188	175	378
1957, Est.	-----	25	450	75	550

U.S. Bureau
of Mines

TABLE VII (continued)

UNITED STATES AND OUTSIDE IMPORTS AND EXPORTS OF SULPHUR

Thousand Long Tons

UNITED STATES EXPORTS

(Assumed equal to Outside Imports)

	<u>Crude Bulk</u>	<u>Crushed and Ground</u>	<u>Pyrites</u>	<u>Total</u>
1937	675	14	0	689
1938	579	13	0	592
1939	628	25	0	653
1940	746	20	0	766
1941	729	31	0	760
1942	568	17	0	585
1943	657	25	0	683
1944	654	22	0	676
1945	919	24	0	943
1946	1,189	57	0	1,246
1947	1,299	50	0	1,349
1948	1,263	33	0	1,296
1949	1,431	30	0	1,461
1950	1,440	38	0	1,478
1951	1,287	24	0	1,312
1952	1,304	34	0	1,338
1953	1,241	30	0	1,271
1954	1,645	30	0	1,675
1955	1,598	35		1,636
1956	1,651	24	0	1,675
1957, Est.	1,500	15	0	1,515

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